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10/823,465	04/13/2004	Walter E. Red	1737.2.15	4603

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EXAMINER	
NORTON, JENNIFER L	
ART UNIT	**PAPER NUMBER**
2121	

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03/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

Interview Summary	Application No.	Applicant(s)	
	10/823,465	RED ET AL.	
	Examiner	Art Unit	
	Jennifer L. Norton	2121	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Jennifer L. Norton*. (3) *Walter E. Red*.

(2) *Craig Madson Reg. No. 29,407*. (4)_____.

Date of Interview: *21 March 2007*.

Type: a)☐ Telephonic b)☐ Video Conference
c)☒ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative] mailed to applicant

Exhibit shown or demonstration conducted: d)☒ Yes e)☐ No.
If Yes, brief description: *Comparsion Chart of the Differences between U.S. Patent No. 6,499,054, U.S. Patent No. 6,028,412 and the Instant Application*.

Claim(s) discussed: *1, 11 and 22 (independent claims)*.

Identification of prior art discussed: *U.S. Patent No. 6,499,054 and U.S. Patent No. 6,028,412*.

Agreement with respect to the claims f)☐ was reached. g)☒ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *The Applicant presented arguments that Hesslink nor Shine teaches the limitation of executing control software in the host as disclosed in the independent claims. In addition, the Applicant presented prior art with respect to the limitation of a control frequency that is assigned a value of 2^n. The Examiner has fully considered Applicant's arguments and reserves final judgment until Applicant files an Amendment After Non-Final*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)
In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

VMAC Comparison to Hesslink/Shine

VMAC Core Features	Red et al.Claims	Hesslink	Shine
Eliminate device hardware (micro) controllers.	Claim 1, 2, 7, etc. (implied, since control loops closed at host control device in software) See BACKGROUND and DETAILED DESCRIPTION.	NO Hesslink teaches the use of existing hardware controllers.	NO Shine teaches a frequency generator to be embedded in an IC or hardware controller using 2^N register comparisons.
Central control host runs software-based real-time control processes at specified frequencies, replacing device hardware controllers.	Claim 1, 4, 5, 6, 11 etc. Real-time is implicit since capable of running 2^N frequencies*. Also described in DETAILED DESCRIPTION.	NO Hesslink teaches several host devices (computers) including client process hosts, and servers. Hesslink does not teach a central host running frequency-based real-time processes, controlling device components over a network, eliminating device micro-controllers.	NO Shine does not teach a central control host running one or more software-based device control processes at specified device frequencies, replacing device hardware controllers.
Central control host closes servo-control loops over real-time network to device components.	Claim 1, 3, 13, 18 Also described in DETAILED DESCRIPTION.	NO Hesslink does not teach servo-control over networks to device components; rather teaches conventional network monitoring of and commands to hardware device controllers through lab servers.	NO Shine does not teach distributed network communications or control; rather teaches a frequency based clock system that is integrated into control hardware for controlling a device.
Devices can be controlled at different frequencies over network from central control host.	Claim 1, 4, 5, 6, etc. Also described in DETAILED DESCRIPTION.	NO Hesslink does not teach control of devices at specified frequencies, rather teaches control through existing device hardware.	NO Shine teaches generating a control frequency required for a device through an IC or microcontroller. He does not teach a central host controlling one or more devices at different frequencies concurrently.

* NOTE: 2^N *as a frequency generator is not a critical VMAC claim element, since there are other methods for generating unique frequencies, e.g., 2N*

MICROCOMPUTERS AND MODERN CONTROL ENGINEERING

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2^N register comparisons is not unique!

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set. This will also need an *instruction register* in which the instruction fetched from memory can be held while it is being decoded.

Figure 7-5 is a picture of the things we have developed so far and how they might be connected to one another.

Steered by the instruction decoder, numbers may be fetched from the memory and placed in the program counter (to cause the program to branch), in the memory address register (to be used as the addresses of any location in the memory), or in the accumulator or any of the "general-purpose" registers (B, C, etc.) we might include in our complement of hardware. Numbers may also be transferred from registers to the ALU, for arithmetic and logical operations, and back again.

Because it is devoted to processing numbers, logical terms, and instructions (and to distinguish it from the memory and other items of equipment we may add), we will call everything in Fig. 7-5 except the memory the *central processing unit* and abbreviate it "CPU."

The names we chose for the parts of this computer are the names commonly used for them by engineers and programmers. It is evident that many variations and refinements of this arrangement are possible—additional registers might be useful, more powerful instructions might be added, different ways of interfacing between the memory and the CPU might yield a higher performance design, and so on. We see some examples of these in the next chapter, where we examine the designs of several actual microcomputers.

SIZE

Computers are often referred to as "8-bit," "16-bit," and "32-bit" computers. There are also "4-bit," "12-bit," and "24-bit" computers. When used in this way, these terms refer to the number of bits in the principal general-purpose registers and accumulator of the CPU. The most commonly used computers have register sizes that are multiples of eight bits. These are not necessarily representative of the majority of the world population of computers, because most of the microcomputers used in the ubiquitous pocket calculators are of the 4-bit type. Some computers have mixed register sizes.

The optimum size of a register depends on how it is to be used and, most particularly, on the number of *states* needed—that is, the number of numbers that it must be able to represent. A register of n bits has 2^n possible states. The table below lists several common sizes and their number of possible states:

n	*States*	n	*States*
4	16	16	65536
8	256	24	16777216
12	4096	32	4294967296

Clearly, the more bits in a register, the more resolution and dynamic range it has. A 32-bit computer can perform computations to more than nine significant digits. It can count up to the estimated world population as of 1978.

In talking about these numbers, the symbol "K" is used to stand for $2^{10} = 1024$ (very close to the number 1000, for which "k" is sometimes used). Thus, a 16-bit register has

$$2^{16} = 2^6 \cdot 2^{10} = 64 \cdot 1024 = 64\text{K} \qquad (7.13)$$

possible states. This is a popular size for program counters and memory address registers in many computers, allowing them to specify 65536 distinct memory locations.

The optimum size of a register is a compromise between hardware cost and the degree to which high resolution and wide dynamic range are actually needed. If the computer is to be applied to complex computational problems in which high resolution and wide dynamic range are important (e.g., weather prediction, astrophysics, quantum physics), it will be most convenient for its programmers if it is equipped with "wide" registers. If the computer is to be applied to a simple control problem in which resolution to only about 0.5 percent is needed, then 8-bit registers will generally suffice and will cost less.

If, from time to time, a program must handle numbers that will not "fit" within one of its registers, the programmer can use *multiple-precision* techniques: treating a pair or triplet of registers as if they were concatenated, with an implied factor of the appropriate power of 2 applied to the most significant of the pair. Although there may be added costs for these approaches, they are generally less than the cost of making *every* register in the computer wide enough to handle every number it might encounter.

Most numbers handled by most programs are less than 256. This range allows us to represent the letters of the English alphabet (and also many non-English alphabets), numerals, punctuation marks, and so on, using the ASCII code or similar codes. It allows us to count or total many commonly used quantities (e.g., the number of steps in one revolution of a stepping motor, the degree to which a valve is open to within about 0.5 percent). Thus, 8-bit registers are a reasonable compromise found in many computers.

These 8-bit numbers are called *bytes*. (In an even lighter vein, 4-bit numbers are then called "*nibbles*" by some, although this term has not attained the same official stature in the jargon as has the term "byte.")

Because 8-bit numbers are so common, it has become widespread practice to organize memories around this size. The use of "byte-